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Critical Review: Trends in Onroad Transportation Energy and Emissions

Additional perspectives on transportation energy trends and recent compliance issues

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Four additional perspectives with an emphasis on *disruptions*

1) Role of electrification – green electrons and molecules

2) Transportation planning and sustainable communities – the California after SB 375, Steinberg (2008)

3) Auto industry megatrends: autonomous, connected, electric, shared

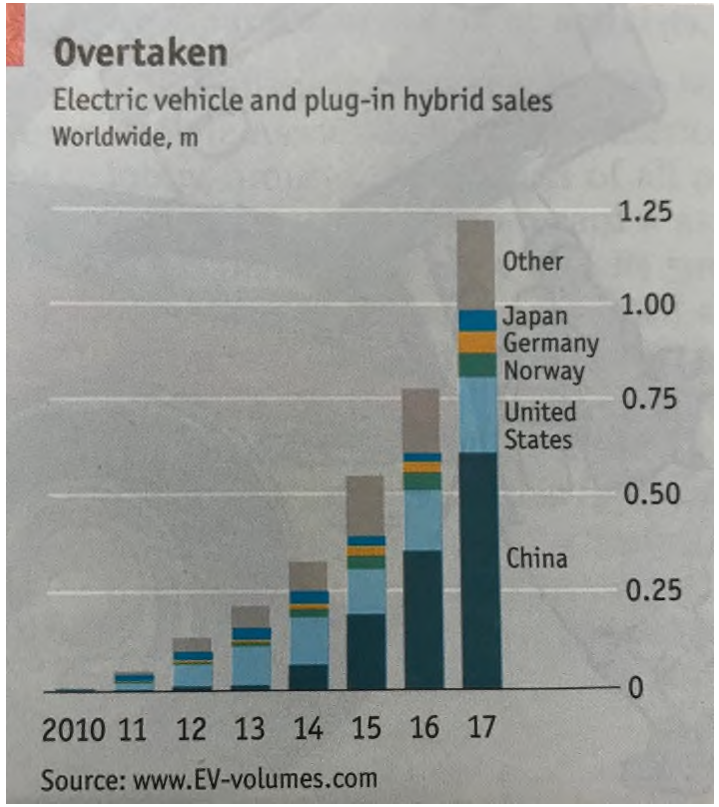
4) Compliance and enforcement for ensuring benefits

1) Transportation electrification enablers: green electrons and molecules

The no-compromise and cheat-proof alternative to petroleum combustion

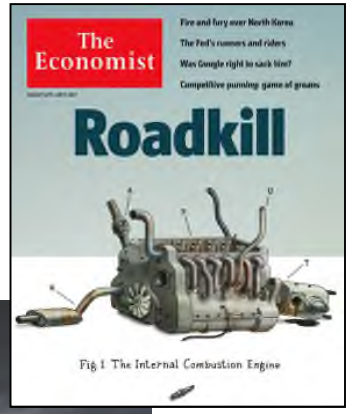
- **No need for sequencing - cannot wait to clean up the grid…..and then deploy Evs**
- **Even if electrons are coal-based, the AQ/GHG benefit of EVs is still clear - reduced exposure risk to combustion toxics, lessen urban heat island effect, V2G and integrated resource management, etc.**

Many drivers pushing for transformation of transportation toward electrification



Reference: The Economist, 3/3/18

California ZEV targets: 1.5m/2025, 5m/2030, ?/2040, ?/2050



California lawmaker wants to ban gas car sales after 2040

BY ALEXEI KOSEFF

France and the United Kingdom are doing it. So is India. And now one lawmaker would like California to follow their lead in phasing out gasoline- and diesel-powered vehicles.

When the Legislature returns in January, Assemblyman Phil Ting plans to introduce a bill that would ban the sale of new cars fueled by internal-combustion engines after 2040. The San Francisco Democrat said it's essential to get California drivers into an electric fleet if the state is going to meet its greenhouse gas reduction targets, since the transportation sector accounts for more than a third of all emissions.

"The market is moving this way. The entire world is moving this way," Ting said. "At some point you need to set a goal and put a line in the sand."

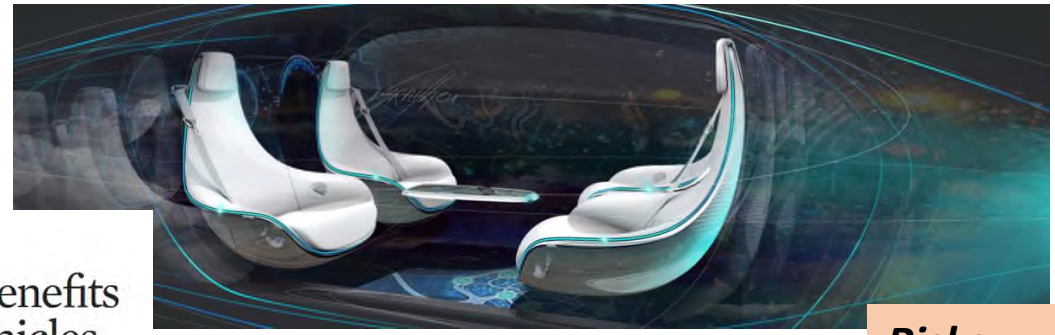
"*sooner or later the country will have to ban diesel cars*" Angela Merkel, German Chancellor

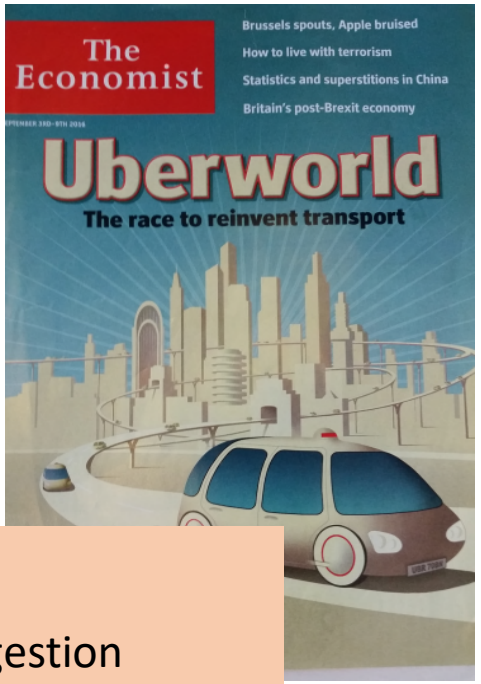
2) Transportation planning and sustainable communities

- Long-standing state policies in place
- One example: Sustainable Communities and Climate Protection Act, SB 375 (Steinberg, 2008) - transportation planning, travel demand models, sustainable communities, environmental review
- Integration of land use and transportation policies to reduce GHG emissions from driving
- Based on per capita GHG emission reduction target
- Encourage transportation mode shift and innovation
- Goal is better mobility, not just better (i.e., cleaner) transportation

3) Preparing for revolution and evolution

Auto industry megatrends: autonomous, connected, electric, shared






Union of Concerned Scientists

POLICY BRIEF

Maximizing the Benefits of Self-Driving Vehicles

Principles for Public Policy

HIGHLIGHTS

Self-driving vehicles have the potential to improve the safety, accessibility, and convenience of transportation substantially, but they also may increase energy use, transportation-related pollution, and roadway congestion. Public policy must take into account both the positive and negative potential of this emerging technology on communities and the environment. Doing so will help ensure that the introduction and use of self-driving vehicles reduce

Autonomous, or self-driving, vehicle technology may be the most significant innovation in transportation since the mass introduction of automobiles in the early 20th century. Whether the widespread adoption of self-driving vehicles results in positive outcomes in the years ahead will depend largely on how public policy guides the introduction of this emerging technology today. The potential benefits include safer roads, more affordable transportation, improved access to jobs, and a cleaner, healthier environment. Without well-crafted policy, though, self-driving vehicles could increase vehicle miles traveled and global warming emissions, worsen congestion, exacerbate air pollution, and put millions of Americans out of work (Litman 2016).

UCS has outlined a set of principles that policymakers, businesses, and other stakeholders can follow to shape the introduction of self-driving vehicles in ways that reduce oil consumption and global warming emissions, protect public health, and enhance mobility for all.

Opportunities

- Lower pollution and GHG emissions*
- Safer
- Better access to destinations
- Integration with transit/other modes
- Faster ZEV cost payback
- Reduced parking needs
- Active transportation (*from changing car ownership attitudes*)

*Mcity, NREL

Risks

- VMT growth & congestion (*because we are still a car culture*)
- Mode shift from transit
- Limited access to data
- Limited ZEV fueling access

Considerations at state and local levels

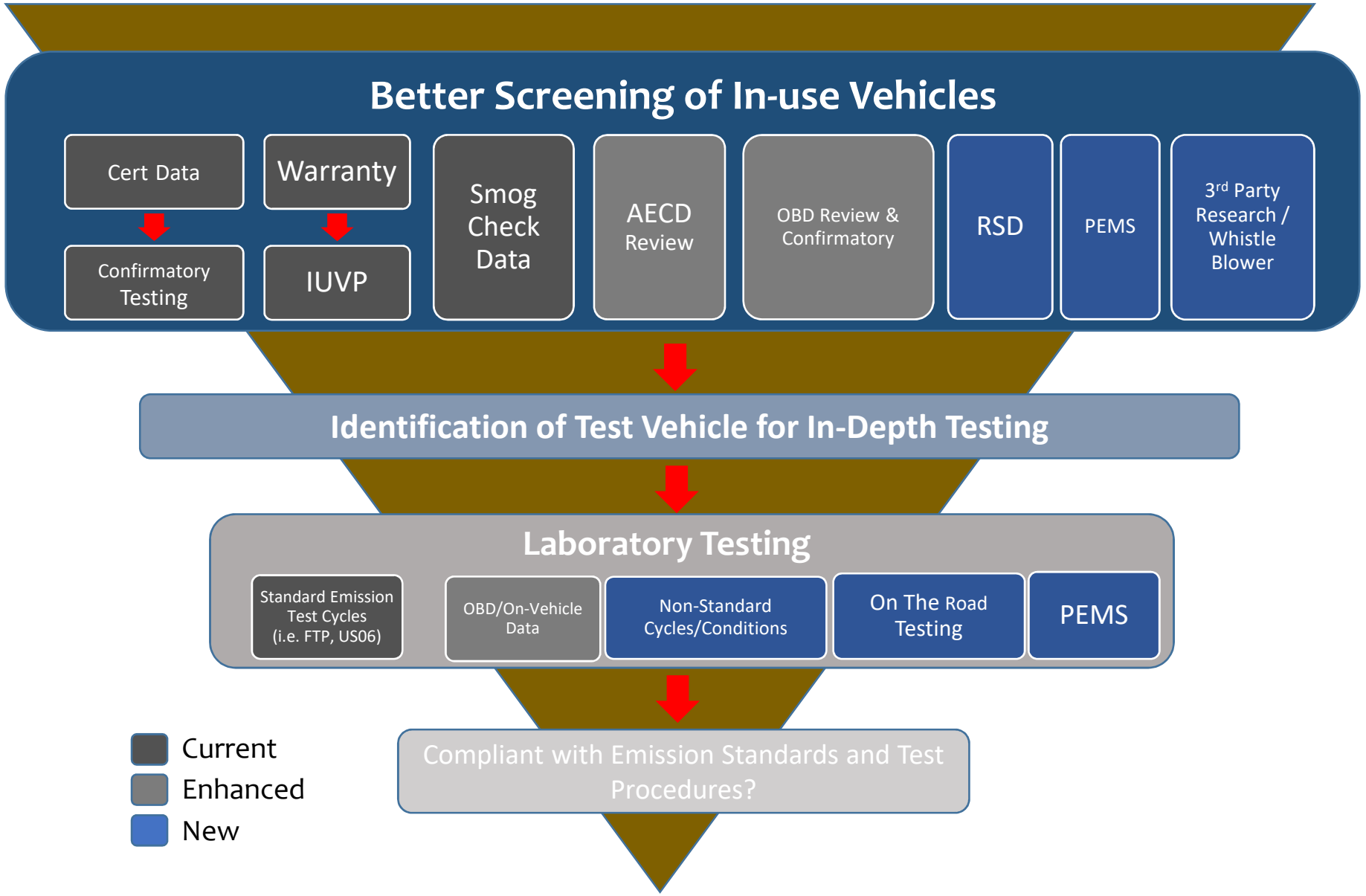
- Considering ZEV-CAV requirements in new policies (e.g., state regulations, city ordinances, regional incentives)
- EV infrastructure to enable EV autonomous and ride hailing
- EV ride hailing requirements
- Beneficial road user charges for ZEV-CAV
- SB 375 – consider GHG quantification of shared use trips
- Expand pooling of riders
- Discourage empty miles (in CAVs, ride hailing)
- Link to transit (e.g. subsidize ride hailing to transit)
- EV only zones (e.g. City of LA concept)
- Congestion mitigation (e.g. priority curb drop off areas)

4) Lessons learned for compliance and enforcement to ensure benefits

- Now, everyone is watching (i.e., multiple stakeholders vested)
- 3rd party in-use testing is a very good thing
- So is corporate responsibility
- Strong research, compliance testing, and enforcement is essential
- What, why, how…

- PEMS only tells you the “what”
- OBD expertise, intense questioning, analyses, etc. got to the “why” and the “how”
- Going forward – enhanced certification, in-use compliance testing, analysis, enforcement – “we just need a new, better wheel”

A new inverted pyramid approach



New screening and selection of test vehicles

New approaches in the dynamometer laboratory and outside on the road

Evolution of OBD. More data stored for interrogation

Enhance requirements for warranties, durability, in-use testing, certification, public disclosure, etc.